WHAT IS CLAIMED IS:

- 1. An isolated and purified nucleic acid molecule that encodes a mammalian histamine H4 receptor protein, said nucleic acid molecule comprising a member selected from a group consisting of:
 - (a) a nucleic acid molecule encoding a protein having at least 70% identity to a polypeptide comprising amino acids 1 to 390 of SEQ ID NO:2;
 - (b) a nucleic acid molecule which is complementary to the polynucleotide of
 (a);
 - (c) a nucleic acid molecule comprising at least 15 sequential bases of the polynucleotide of (a) or (b);
 - (d) a nucleic acid molecule that hybridizes under stringent conditions to the polynucleotide molecule of (a);
 - (e) a nucleic acid molecule encoding a protein having at least 70% identity to a polypeptide comprising amino acids 1 to 391 of SEQ ID NO:8;
 - (f) a nucleic acid molecule which is complementary to the polynucleotide of (e);
 - (g) a nucleic acid molecule comprising at least 15 sequential bases of the polynucleotide of (f) or (e);
 - (h) a nucleic acid molecule that hybridizes under stringent conditions to the polynucleotide molecule of (e);

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(i) a nucleic acid molecule encoding a protein having at least a 70% identity

to a polypeptide comprising amino acids 1 to 391 of SEQ ID NO:9; (j) a nucleic acid molecule which is complementary to the polynucleotide of (i); 5 (k) a nucleic acid molecule comprising at least 15 sequential bases of the polynucleotide of (i) or (j); (1) a nucleic acid molecule that hybridizes under stringent conditions to the polynucleotide molecule of (i); (m) a nucleic acid molecule encoding a protein having at least a 70% identity to a polypeptide comprising amino acids 1 to 389 of SEQ ID 10 NO:10; (n) a nucleic acid molecule which is complementary to the polynucleotide of (m); (o) a nucleic acid molecule comprising at least 15 sequential bases of the polynucleotide of (m) or (n); and 15 (p) a nucleic acid molecule that hybridizes under stringent conditions to the polynucleotide molecule of (m). 2. The nucleic acid molecule of claim 1 wherein the polynucleotide is RNA. 20 3. The nucleic acid molecule of claim 1 wherein the polynucleotide is DNA.

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4. The isolated and purified nucleic acid molecule of claim 1, having a nucleotide sequence selected from a group consisting of: (SEQ.ID.NO.:1), (SEQ.ID.NO.:5), (SEQ.ID.NO.:6), and (SEQ.ID.NO.:7).

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- 5. The isolated and purified nucleic acid molecule of claim 1, wherein said nucleic acid molecule is genomic DNA.
- 6. An expression vector for expression of a mammalian histamine H4 receptor protein in a recombinant host, wherein said vector contains a nucleic acid sequence encoding a mammalian histamine H4 receptor protein.
 - 7. The expression vector of claim 6, wherein the expression vector contains a nucleic acid molecule encoding a mammalian histamine H4 receptor protein having a nucleotide sequence selected from a group consisting of: (SEQ.ID.NO.:1), (SEQ.ID.NO.:5), (SEQ.ID.NO.:6), or (SEQ.ID.NO.:7).
 - 8. The expression vector of claim 6, wherein the expression vector contains genomic DNA encoding a mammalian histamine H4 receptor protein.

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- 9. A recombinant host cell containing a recombinantly cloned nucleic acid molecule encoding a mammalian histamine H4 receptor protein.
- 10. The recombinant host cell of claim 9, wherein said nucleic acid molecule has a nucleotide sequence selected from a group consisting of: (SEQ.ID.NO.:1); (SEQ.ID.NO.:5), (SEQ.ID.NO.:6), and (SEQ.ID.NO.:7).
- 11. The recombinant host cell of claim 9, wherein said cloned nucleic acid molecule is genomic DNA.

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- 12. A protein in substantially pure form that functions as mammalian histamine H4 receptor protein.
- 13. The protein according to claim 12, having an amino acid sequence selected from a group consisting of: (SEQ.ID.NO.:2), (SEQ.ID.NO.:8), (SEQ.ID.NO.:9), and (SEQ.ID.NO.:10).
 - 14. A monospecific antibody immunologically reactive with a mammalian histamine H4 receptor protein.

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- 15. The antibody of Claim 14, wherein the antibody blocks activity of the mammalian histamine H4 receptor protein.
- 16. A process for expression of mammalian histamine H4 receptor protein in a recombinant host cell, comprising:
 - (a) transferring the expression vector of Claim 6 into suitable host cells; and
 (b) culturing the host cells of step (a) under conditions which allow
 expression of the mammalian histamine H4 receptor protein from the
 expression vector.

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- 17. A method of identifying compounds that modulate mammalian histamine H4 receptor protein activity, comprising:
 - (a) combining a putative modulator of mammalian histamine H4 receptor protein activity with mammalian histamine H4 receptor protein; and(b) measuring an effect of the modulator on the protein.

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18. The method of claim 17, wherein the effect measured in step (b) is competition between the modulator of step (a) with a known ligand of the histamine H4 receptor for binding to the receptor.

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19. The method of claim 17, wherein the effect measured in step (b) is modulation of a histamine H4 receptor intracellular second messenger.